The Planet People: New Looks at the Old

The most impressive evidence yet pointing toward a possible solar system around another star, the first sharp "look" at the ring system of Uranus, a hint that recently formed meteorites may have come from parent objects different from those that spawned older space rocks. These dramatic new findings highlighted the annual meeting of the American Astronomical Society's Division for Planetary Sciences (DPS), which as recently as two years ago was an occasion for glum prognostications about the imminent death of space science in the United States. Last week's meeting was a more optimistic affair, with a 25 percent increase in attendance (of course, it *was* in Hawaii).

Last year, researchers reported that an "excess brightness" in measurements from the Infrared Astronomy Satellite (IRAS) seemed to be "the first direct evidence of solid material in orbit around another star." Three more examples were subsequently reported, and the IRAS team is said to be examining as many as 70 other candidates. Despite press reports of "new solar systems" and "planets in formation," however, the IRAS data supported only the presence of tiny, perhaps millimeter-sized particles in orbit around such stars as Vega (SN: 8/20/83, p. 116) and Fomalhaut (SN: 12/24/83, p. 406). The possibility of larger, even planet-sized chunks remained a matter for theorists.

It still is, but the case was advanced a dramatic step forward at the DPS meeting with the report of a thin disk of material discovered during earth-based observations of a star, Beta Pictoris, that was already on the IRAS list. Working with the 2.5-meter telescope at Las Campanas Observatory in Chile, Bradford A. Smith of the University of Arizona in Tucson and Richard J. Terrile of Jet Propulsion Laboratory in Pasadena, Calif., found that "Beta Pic" is at the center of a huge disk of particles extending outward some 60 billion kilometers. Seen almost exactly edge-on, the disk is also extremely thin. And a key point, notes Smith, is that the star itself can still be seen through the edge-on disk. Its visibility through the disk's whole radial length, he says, and with the outer part of the disk clearly visible in the photos (charge-coupled-device, or CCD, images), could mean that the particles in the inner region are missing — as if they have come together into a much smaller number of much larger particles. Like a solar system.

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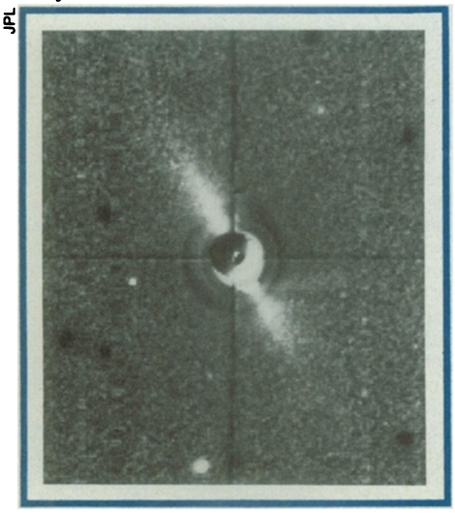

Beta Pictoris: Star of another solar system?

Most of the disk's extent, the researchers believe, is too far from Beta Pictoris to be involved in planet formation, but it could also be that its vast stretch is in fact caused by particles sent out that far by the gravitational effects of planets that accreted (came together) farther in. If there is indeed such a solar system, says Smith, it is probably a young one — perhaps a few hundred million years old — or the remaining particles would have been spread out into a much thicker disk.

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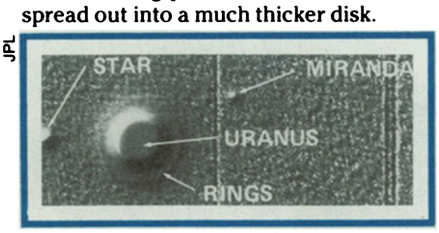
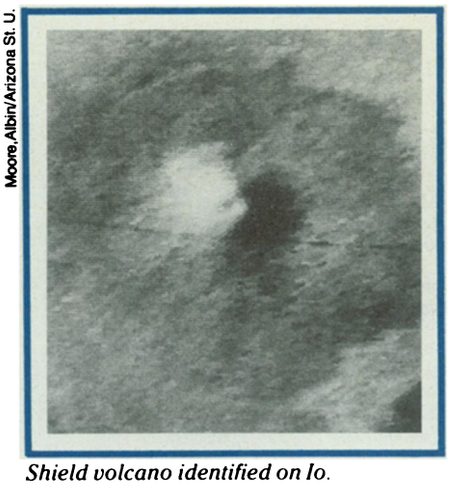


First clear view of Uranus's ring system (though not showing individual rings) enhanced by computer-added "shadowing."

Another major DPS topic was Jupiter's bizarre moon Io, whose active volcanism — the only example known besides earth's own — was discovered in 1979 by the Voyager 1 spacecraft (SN: 3/17/79, p. 165). After half a decade, researchers still disagree about whether Io's sulfur-rich variety of volcanism (with sulfur dioxide possibly filling the role of earth's water to drive the eruptions) has left a layer of elemental sulfur plating the surface, but more is continually being learned. Io's volcanic complexion, for example, has seemed to include only a variety of flows, fissures, rivulets and calderas, but Jeffrey M. Moore and E. F. Albin from Arizona State University showed the DPSers an overlooked portion of a Voyager photo revealing a classic shield volcano — your basic peaked slab with a hole in the middle. Earth-based studies have helped, too, such as when Jeffrey S. Morgan and colleagues from the University of Hawaii presented what is believed to be the first-ever image of Io's potassium torus, a cloud of potassium atoms that extends around Io's orbit but which has previously been known only from spectroscopy.

Moore, Albin/Arizona St. U.



Shield volcano identified on Io.

Yet another striking image, again by Smith and Terrile, was described as the "first clear photograph" of the rings of Uranus. Again using the CCD camera at Las Campanas Observatory, it showed the overall disk of the rings as a sharp-edged feature bordered by the wide, eccentric "epsilon" ring, where previously the Uranian rings had been imaged only as a diffuse blur (SN: 11/11/78, p. 324). Resolving the nine known individual rings in a photo, however, may have to await the arrival of Voyager 2 at Uranus in early 1986.

Even without spacecraft, a topic of increasing interest in recent years has been meteorites, which, although their points of origin have usually remained unknown, are essentially space probes for free. A major addition to the terrestrial meteorite collection has been the finding of numerous examples on the frozen wastes of Antarctica, where they remain far less weathered and eroded than if they have sat out their years in warmer latitudes. One consequence has been that meteorites recovered from temperate climes are usually younger, while many Antarctic samples have been found that are hundreds of millions of years old. But there is more than age distinguishing the batch from the bottom of the world. Michael E. Lipschutz of Purdue University in West Lafayette, Ind., reported that 9 of 13 trace elements in a selection of 300,000-year-old H5 chondrite meteorites from Antarctica, for example, show different ratios from those in the much newer samples. The fact that the two groups were found in different places seems unlikely to account for the difference, but another possibility could be that the materials from which they formed have changed over time. The implication, notes John Annexstad of Johnson Space Center in Houston, could be "a whole new direction in planetary science."

—J. Eberhart